PATENT SPECIFICATION

806,745

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COMPLETE SPECIFICATION

Improvements in Diaphragm Valves

We, HILLS-MCCANNA COMPANY, a corporation organised under the laws of the State of Illinois, United States of America, of 3025 North Western Avenue, Chicago 18, Illinois, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

In conventional diaphragm type valves, i.e., valves in which a diaphragm is compressed against a weir to control fluid flow, it is customary to anchor a bolt in the centre of the diaphragm which can be threaded into a tapped recess in the centre of the compressor so that the diaphragm can be moved positively from closed to open position. It has also been suggested to lock the diaphragm and compressor together by driving a pin through the centre of the compressor and the centre of the diaphragm. The several means heretofore used for attaching the diaphragm to the compressor have the disadvantage that it is difficult to line up the diaphragm bolt holes with the bolt holes of the valve body and bonnet flanges and to line up the compressor with the bonnet grooves when the diaphragm and compressor are united, unless all parts are made with great precision.

In diaphragm valves according to the present invention a diaphragm is fastened at its centre to the compressor by means comprising an integral upstanding round boss at the centre of the diaphragm having a peripheral groove disposed in a plane substantially normal to the axis of the boss and at least one member passing through an opening in the compressor and engaging the groove. Thus the boss is locked in the compressor against straight line motion, but rotary motion of the diaphragm is permitted while the compressor remains stationary.

The accompanying drawing shows one example of a diaphragm valve according to the present invention. In this drawing:—

Figure 1 is a fragmentary vertical cross-section through the centre of the valve in open position;

Figure 2 is a vertical cross-section of the diaphragm and compressor taken at ninety degrees to Figure 1 with the diaphragm in closed position; and

Figure 3 is an isometric view of the diaphragm with the compressor in broken outline.

The diaphragm 5 is clamped between a flange 7 of a bonnet 9 and a flange 11 of a body 13. The diaphragm shown in the drawing is essentially rectangular in outline with a bolt hole 15 in each corner. It will be understood that the outline of the diaphragm may be oval, circular or other shape corresponding to that of the body and bonnet flanges.

The diaphragm has a central boss 17 which may be cylindrical or frusto-conical in shape and is formed with a peripheral groove 25. The boss is sufficiently thick so as to be hard and withstand distortion under operating conditions. The surface defining the groove 25 may be curved or straight sided, but the groove is sufficiently deep to serve the purpose hereinafter set forth. The surface defining the groove shown in the drawing is arcuate.

The diaphragm is preferably made of polytetrafluorethylene, polyethylene or other synthetic plastic suitable for use as a diaphragm, although it may be made of natural or synthetic rubber or elastomer, provided the central boss 17 is sufficiently hard not to distort under operating conditions. If a relatively stiff plastic material such as polytetrafluorethylene is used for moulding the diaphragm, it is desirable to provide continuous narrow beads 19 on each face of the diaphragm adjacent the edge and surrounding the bolt holes to form a narrow clamping surface between the body and bonnet flanges. This structure enables the diaphragm to have a floating action and to readily pass from open to closed position without undue strain and risk of cracking. The diaphragm also has a bead 21 running across the centre of its underside, adapted to seat on the valve weir 23 when in closed position.

The compressor 27 is formed with a centre bore 31 which is counterbored at the lower end to snugly accommodate the boss 17 and counterbored at its upper end 33 to loosely accommodate the lower end 35 of a threaded stem 37 which is threaded through a rotatable sleeve 38.

[Price 3s. 6d.]

Price 4s 6d

The compressor has two spaced holes drilled through it transversely to its length these holes being in the same plane as the groove 25 when the diaphragm and compressor are assembled. To lock the diaphragm and compressor together, drive pins 29 are driven into the holes bored in the compressor and nest in the groove 25. The pins fit snugly in the compressor holes and one end portion of each of the pins is serrated so as to deform the walls of the holes and so lock tightly in the holes. Because the pins do not pass through the boss, the diaphragm can be rotated while the compressor remains stationary or the compressor can be rotated while the diaphragm is stationary without disturbing the tight locking between diaphragm and compressor. Thus, it is possible to align the diaphragm so that the bolt holes 15 are aligned with the bonnet and body bolt holes and independently to align the compressor so that the ends 39 of the compressor are aligned with bonnet grooves 41 in which the ends ride and which keep the compressor from turning when the sleeve 38 is rotated in conventional manner by means of a hand wheel, not shown.

The lower end 35 of the stem is fastened to the compressor by means of a pin 45 which fits snugly in a hole 47 bored through the upstanding central portion of the compressor, and passes through a hole 49, in the lower end 35 of the stem, which can be aligned with the hole 47. The hole 49 is larger in diameter than the pin 45 in order to make a loose connection.

It will be understood that instead of the drive pins, the compressor can be equipped with equivalent members to lock the compressor and diaphragm together so that they are rotatable with respect to each other.

WHAT WE CLAIM IS:—

1. A diaphragm valve having a compressor and a diaphragm fastened at its centre to the compressor by means comprising an integral upstanding round boss at the centre of the diaphragm having a peripheral groove disposed in a plane substantially normal to the axis of the boss and at least one member passing through an opening in the compressor and engaging the groove.

2. A valve according to claim 1 in which the member is a pin having a middle portion engaging the groove, and both ends lying in openings in the compressor.

3. A valve according to claim 2 in which the pin is locked in the compressor.

4. A valve according to claim 2 or claim 3 in which there are two pins engaging the groove at diametrically opposite sides of the boss.

5. A valve according to any of claims 1 to 4, in which the diaphragm is moulded from a plastic such that the boss is sufficiently hard not to distort under operating conditions.

6. A valve according to claim 5 in which the plastic is polytetrafluorethylene.

7. A diaphragm valve substantially as described with reference to the accompanying drawings.

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806,745 COMPLETE SPECIFICATION
1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

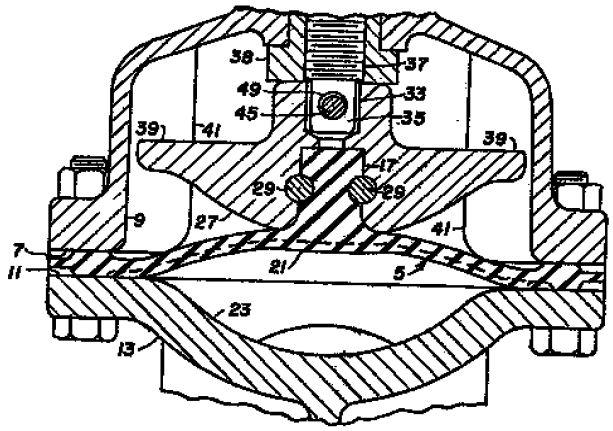

FIG. 1

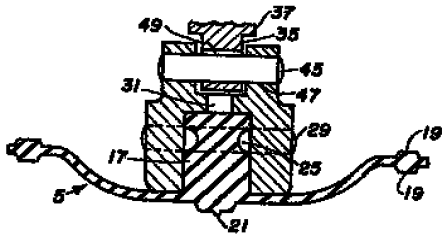

FIG. 2

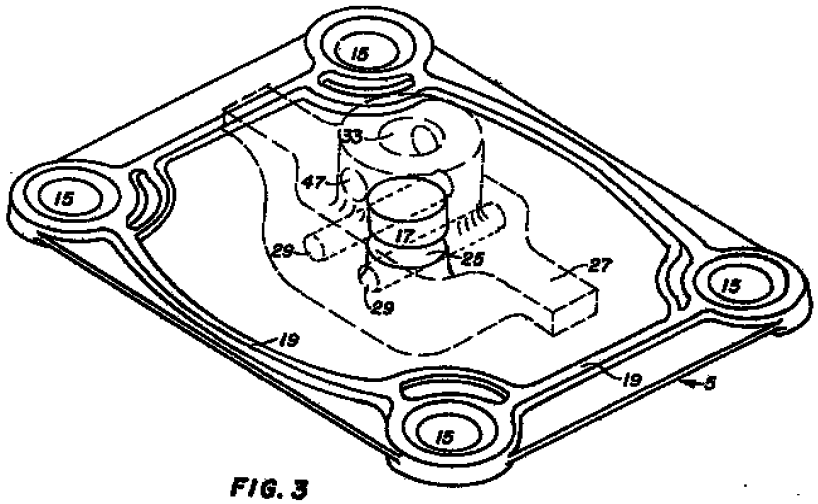

FIG. 3